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SEQUENCE LISTING

<110> Wyeth  
Cassetti, Maria C.  
Smith, Larry

<120> HUMAN PAPILLOMAVIRUS POLYPEPTIDES AND IMMUNOGENIC COMPOSITIONS

<130> 00630/200M137-WOO

<150> US 60/415,929

<151> 2002-10-03

<160> 65

<170> PatentIn version 3.1

<210> 1

<211> 248

<212> PRT

<213> Human papillomavirus type 16

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Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu Glu Cys Val Tyr  
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Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe Arg  
35 40 45

Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Cys Asp  
50 55 60

Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr Cys  
65 70 75 80

Tyr Ser Val Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro Leu  
85 90 95

Cys Asp Leu Leu Ile Arg Cys Ile Asn Cys Gln Lys Pro Leu Cys Pro  
100 105 110

Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn Ile  
115 120 125

Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys Arg Ser Ser Arg  
130 135 140

Thr Arg Arg Glu Thr Gln Leu His Gly Asp Thr Pro Thr Leu His Glu  
145 150 155 160

Tyr Met Leu Asp Leu Gln Pro Glu Thr Thr Asp Leu Tyr Cys Tyr Glu  
165 170 175

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Gln Leu Asn Asp Ser Ser Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala  
 180 185 190

Gly Gln Ala Glu Pro Asp Arg Ala His Tyr Asn Ile Val Thr Phe Cys  
 195 200 205

Cys Lys Cys Asp Ser Thr Leu Arg Leu Cys Val Gln Ser Thr His Val  
 210 215 220

Asp Ile Arg Thr Leu Glu Asp Leu Leu Met Gly Thr Leu Gly Ile Val  
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Cys Pro Ile Cys Ser Gln Lys Pro  
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 gctgtatgtg ataaatgttt aaagttttat tctaaaatta gtgagtatag acattattgt 240  
 tatagtgtgt atggaacaac attagaacag caatacaaca aaccgttggtg tgatttgta 300  
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 cattacaata ttgtaacctt ttgttgcaag tgtgactcta cgcttcggtt gtgcgtacaa 660  
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<210> 3  
 <211> 248  
 <212> PRT  
 <213> Human papillomavirus type 16

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 1 5 10 15

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Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu Glu Cys Val Tyr  
 20 25 30  
 Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe Arg  
 35 40 45  
 Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Gly Asp  
 50 55 60  
 Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr Cys  
 65 70 75 80  
 Tyr Ser Val Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro Leu  
 85 90 95  
 Cys Asp Leu Leu Ile Arg Cys Ile Asn Gly Gln Lys Pro Leu Cys Pro  
 100 105 110  
 Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn Ile  
 115 120 125  
 Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys Arg Ser Ser Arg  
 130 135 140  
 Thr Arg Arg Glu Thr Gln Leu His Gly Asp Thr Pro Thr Leu His Glu  
 145 150 155 160  
 Tyr Met Leu Asp Leu Gln Pro Glu Thr Thr Asp Leu Tyr Gly Tyr Gly  
 165 170 175  
 Gln Leu Asn Asp Ser Ser Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala  
 180 185 190  
 Gly Gln Ala Glu Pro Asp Arg Ala His Tyr Asn Ile Val Thr Phe Cys  
 195 200 205  
 Cys Lys Cys Asp Ser Thr Leu Arg Leu Cys Val Gln Ser Thr His Val  
 210 215 220  
 Asp Ile Arg Thr Leu Glu Asp Leu Leu Met Gly Thr Leu Gly Ile Val  
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 Cys Pro Ile Cys Ser Gln Lys Pro  
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 cattacaata ttgtaacctt ttgttgcaag tgtgactcta cgcttcggtt gtgcgtacaa 660  
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<210> 5  
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 <213> Human papillomavirus type 16

<400> 5

Met Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu Pro Gln Leu Cys  
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Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu Glu Cys Val Tyr  
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Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe Arg  
 35 40 45

Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Gly Asp  
 50 55 60

Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr Cys  
 65 70 75 80

Tyr Ser Val Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro Leu  
 85 90 95

Cys Asp Leu Leu Ile Arg Cys Ile Asn Gly Gln Lys Pro Leu Cys Pro  
 100 105 110

Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn Ile  
 115 120 125

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Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys Arg Ser Ser Arg  
 130 135 140

Thr Arg Arg Glu Thr Gln Leu His Gly Asp Thr Pro Thr Leu His Glu  
 145 150 155 160

Tyr Met Leu Asp Leu Gln Pro Glu Thr Thr Asp Leu Tyr Gly Tyr Gly  
 165 170 175

Gln Leu Asn Asp Ser Ser Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala  
 180 185 190

Gly Gln Ala Glu Pro Asp Arg Ala His Tyr Asn Ile Val Thr Phe Cys  
 195 200 205

Cys Lys Cys Asp Ser Thr Leu Arg Leu Cys Val Gln Ser Thr His Val  
 210 215 220

Asp Ile Arg Thr Leu Glu Asp Leu Leu Met Gly Thr Leu Gly Ile Val  
 225 230 235 240

Gly Pro Ile Cys Ser Gln Lys Pro  
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<211> 248  
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<400> 7

Met His Gly Asp Thr Pro Thr Leu His Glu Tyr Met Leu Asp Leu Gln  
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Pro Glu Thr Thr Asp Leu Tyr Cys Tyr Glu Gln Leu Asn Asp Ser Ser  
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Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala Gly Gln Ala Glu Pro Asp  
 35 40 45

Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys Cys Asp Ser Thr  
 50 55 60

Leu Arg Leu Cys Val Gln Ser Thr His Val Asp Ile Arg Thr Leu Glu  
 65 70 75 80

Asp Leu Leu Met Gly Thr Leu Gly Ile Val Cys Pro Ile Cys Ser Gln  
 85 90 95

Lys Pro Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu Pro Gln Leu  
 100 105 110

Cys Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu Glu Cys Val  
 115 120 125

Tyr Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe  
 130 135 140

Arg Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Cys  
 145 150 155 160

Asp Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr  
 165 170 175

Cys Tyr Ser Val Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro  
 180 185 190

Leu Cys Asp Leu Leu Ile Arg Cys Ile Asn Cys Gln Lys Pro Leu Cys  
 195 200 205

Pro Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn  
 210 215 220

Ile Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys Arg Ser Ser  
 225 230 235 240

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Arg Thr Arg Arg Glu Thr Gln Leu  
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tgtgactcta cgcttcgggt gtgcgtacaa agcacacacg tagacattcg tactttggaa 240  
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agaacacgta gagaaacca gctgtaa 747

<210> 9  
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Met His Gly Asp Thr Pro Thr Leu His Glu Tyr Met Leu Asp Leu Gln  
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Pro Glu Thr Thr Asp Leu Tyr Gly Tyr Gly Gln Leu Asn Asp Ser Ser  
20 25 30

Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala Gly Gln Ala Glu Pro Asp  
35 40 45

Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys Cys Asp Ser Thr  
50 55 60

Leu Arg Leu Cys Val Gln Ser Thr His Val Asp Ile Arg Thr Leu Glu  
65 70 75 80

Asp Leu Leu Met Gly Thr Leu Gly Ile Val Cys Pro Ile Cys Ser Gln  
85 90 95

Lys Pro Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu Pro Gln Leu  
100 105 110

Cys Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu Glu Cys Val  
115 120 125

Tyr Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe  
130 135 140

Arg Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Gly  
145 150 155 160

Asp Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr  
165 170 175

Cys Tyr Ser Val Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro  
180 185 190

Leu Cys Asp Leu Leu Ile Arg Cys Ile Asn Gly Gln Lys Pro Leu Cys  
195 200 205

Pro Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn  
210 215 220

Ile Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys Arg Ser Ser  
225 230 235 240

Arg Thr Arg Arg Glu Thr Gln Leu  
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<210> 10  
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tatggaacaa cattagaaca gcaatacaac aaaccgttgt gtgatttggt aattaggtgt 600  
 attaacggtc aaaagccact gtgtcctgaa gaaaagcaaa gacatctgga caaaaagcaa 660  
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 agaacacgta gagaaaccca gctgtaa 747

<210> 11  
 <211> 248  
 <212> PRT  
 <213> Human papillomavirus type 16

<400> 11

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 20 25 30

Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala Gly Gln Ala Glu Pro Asp  
 35 40 45

Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys Cys Asp Ser Thr  
 50 55 60

Leu Arg Leu Cys Val Gln Ser Thr His Val Asp Ile Arg Thr Leu Glu  
 65 70 75 80

Asp Leu Leu Met Gly Thr Leu Gly Ile Val Gly Pro Ile Cys Ser Gln  
 85 90 95

Lys Pro Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu Pro Gln Leu  
 100 105 110

Cys Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu Glu Cys Val  
 115 120 125

Tyr Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe  
 130 135 140

Arg Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Gly  
 145 150 155 160

Asp Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr  
 165 170 175

Cys Tyr Ser Val Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro  
 180 185 190

Leu Cys Asp Leu Leu Ile Arg Cys Ile Asn Gly Gln Lys Pro Leu Cys  
 195 200 205

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Pro Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn  
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Ile Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys Arg Ser Ser  
 225 230 235 240

Arg Thr Arg Arg Glu Thr Gln Leu  
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<210> 12  
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 tgtgactcta cgcttcgggt gtgctgacaa agcacacacg tagacattcg tactttggaa 240  
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<210> 13  
 <211> 151  
 <212> PRT  
 <213> Human papillomavirus type 16

<400> 13  
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Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu Glu Cys Val Tyr  
 20 25 30

Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe Arg  
 35 40 45

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Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Cys Asp  
 50 55 60

Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr Cys  
 65 70 75 80

Tyr Ser Val Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro Leu  
 85 90 95

Cys Asp Leu Leu Ile Arg Cys Ile Asn Cys Gln Lys Pro Leu Cys Pro  
 100 105 110

Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn Ile  
 115 120 125

Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys Arg Ser Ser Arg  
 130 135 140

Thr Arg Arg Glu Thr Gln Leu  
 145 150

<210> 14  
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 <212> PRT  
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<400> 14

Met His Gly Asp Thr Pro Thr Leu His Glu Tyr Met Leu Asp Leu Gln  
 1 5 10 15

Pro Glu Thr Thr Asp Leu Tyr Cys Tyr Glu Gln Leu Asn Asp Ser Ser  
 20 25 30

Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala Gly Gln Ala Glu Pro Asp  
 35 40 45

Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys Cys Asp Ser Thr  
 50 55 60

Leu Arg Leu Cys Val Gln Ser Thr His Val Asp Ile Arg Thr Leu Glu  
 65 70 75 80

Asp Leu Leu Met Gly Thr Leu Gly Ile Val Cys Pro Ile Cys Ser Gln  
 85 90 95

Lys Pro

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 <212> PRT

<213> Human papillomavirus type 18

<400> 15

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20 25 30

Val Tyr Cys Lys Thr Val Leu Glu Leu Thr Glu Val Phe Glu Phe Ala  
35 40 45

Phe Lys Asp Leu Phe Val Val Tyr Arg Asp Ser Ile Pro His Ala Ala  
50 55 60

Cys His Lys Cys Ile Asp Phe Tyr Ser Arg Ile Arg Glu Leu Arg His  
65 70 75 80

Tyr Ser Asp Ser Val Tyr Gly Asp Thr Leu Glu Lys Leu Thr Asn Thr  
85 90 95

Gly Leu Tyr Asn Leu Leu Ile Arg Cys Leu Arg Cys Gln Lys Pro Leu  
100 105 110

Asn Pro Ala Glu Lys Leu Arg His Leu Asn Glu Lys Arg Arg Phe His  
115 120 125

Asn Ile Ala Gly His Tyr Arg Gly Gln Cys His Ser Cys Cys Asn Arg  
130 135 140

Ala Arg Gln Glu Arg Leu Gln Arg Arg Arg Glu Thr Gln Val  
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<210> 16

<211> 149

<212> PRT

<213> Human papillomavirus type 31

<400> 16

Met Phe Lys Asn Pro Ala Glu Arg Pro Arg Lys Leu His Glu Leu Ser  
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Ser Ala Leu Glu Ile Pro Tyr Asp Glu Leu Arg Leu Asn Cys Val Tyr  
20 25 30

Cys Lys Gly Gln Leu Thr Glu Thr Glu Val Leu Asp Phe Ala Phe Thr  
35 40 45

Asp Leu Thr Ile Val Tyr Arg Asp Asp Thr Pro His Gly Val Cys Thr  
50 55 60

Lys Cys Leu Arg Phe Tyr Ser Lys Val Ser Glu Phe Arg Trp Tyr Arg  
65 70 75 80

Tyr Ser Val Tyr Gly Thr Thr Leu Glu Lys Leu Thr Asn Lys Gly Ile  
85 90 95

Cys Asp Leu Leu Ile Arg Cys Ile Thr Cys Gln Arg Pro Leu Cys Pro  
100 105 110

Glu Glu Lys Gln Arg His Leu Asp Lys Lys Lys Arg Phe His Asn Ile  
115 120 125

Gly Gly Arg Trp Thr Gly Arg Cys Ile Ala Cys Trp Arg Arg Pro Arg  
130 135 140

Thr Glu Thr Gln Val  
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<210> 17  
<211> 149  
<212> PRT  
<213> Human papillomavirus type 33

<400> 17

Met Phe Gln Asp Thr Glu Glu Lys Pro Arg Thr Leu His Asp Leu Cys  
1 5 10 15

Gln Ala Leu Glu Thr Thr Ile His Asn Ile Glu Leu Gln Cys Val Glu  
20 25 30

Cys Lys Lys Pro Leu Gln Arg Ser Glu Val Tyr Asp Phe Ala Phe Ala  
35 40 45

Asp Leu Thr Val Val Tyr Arg Glu Gly Asn Pro Phe Gly Ile Cys Lys  
50 55 60

Leu Cys Leu Arg Phe Leu Ser Lys Ile Ser Glu Tyr Arg His Tyr Asn  
65 70 75 80

Tyr Ser Val Tyr Gly Asn Thr Leu Glu Gln Thr Val Lys Lys Pro Leu  
85 90 95

Asn Glu Ile Leu Ile Arg Cys Ile Ile Cys Gln Arg Pro Leu Cys Pro  
100 105 110

Gln Glu Lys Lys Arg His Val Asp Leu Asn Lys Arg Phe His Asn Ile  
115 120 125

Ser Gly Arg Trp Ala Gly Arg Cys Ala Ala Cys Trp Arg Ser Arg Arg  
130 135 140

Arg Glu Thr Ala Leu  
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<210> 18  
<211> 149  
<212> PRT  
<213> Human papillomavirus type 35

<400> 18

Met Phe Gln Asp Pro Ala Glu Arg Pro Tyr Lys Leu His Asp Leu Cys  
1 5 10 15

Asn Glu Val Glu Glu Ser Ile His Glu Ile Cys Leu Asn Cys Val Tyr  
20 25 30

Cys Lys Gln Glu Leu Gln Arg Ser Glu Val Tyr Asp Phe Ala Cys Tyr  
35 40 45

Asp Leu Cys Ile Val Tyr Arg Glu Gly Gln Pro Tyr Gly Val Cys Met  
50 55 60

Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg Trp Tyr Arg  
65 70 75 80

Tyr Ser Val Tyr Gly Glu Thr Leu Glu Lys Gln Cys Asn Lys Gln Leu  
85 90 95

Cys His Leu Leu Ile Arg Cys Ile Thr Cys Gln Lys Pro Leu Cys Pro  
100 105 110

Val Glu Lys Gln Arg His Leu Glu Glu Lys Lys Arg Phe His Asn Ile  
115 120 125

Gly Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Trp Lys Pro Thr Arg  
130 135 140

Arg Glu Thr Glu Val  
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<210> 19  
<211> 158  
<212> PRT  
<213> Human papillomavirus type 39

<400> 19

Met Ala Arg Phe His Asn Pro Ala Glu Arg Pro Tyr Lys Leu Pro Asp  
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Leu Cys Thr Thr Leu Asp Thr Thr Leu Gln Asp Ile Thr Ile Ala Cys  
20 25 30

Val Tyr Cys Arg Arg Pro Leu Gln Gln Thr Glu Val Tyr Glu Phe Ala  
35 40 45

Phe Ser Asp Leu Tyr Val Val Tyr Arg Asp Gly Glu Pro Leu Ala Ala  
50 55 60

Cys Gln Ser Cys Ile Lys Phe Tyr Ala Lys Ile Arg Glu Leu Arg Tyr  
65 70 75 80

Tyr Ser Asp Ser Val Tyr Ala Thr Thr Leu Glu Asn Ile Thr Asn Thr  
85 90 95

Lys Leu Tyr Asn Leu Leu Ile Arg Cys Met Cys Cys Leu Lys Pro Leu  
100 105 110

Cys Pro Ala Glu Lys Leu Arg His Leu Asn Ser Lys Arg Arg Phe His  
115 120 125

Lys Ile Ala Gly Ser Tyr Thr Gly Gln Cys Arg Arg Cys Trp Thr Thr  
130 135 140

Lys Arg Glu Asp Arg Arg Leu Thr Arg Arg Glu Thr Gln Val  
145 150 155

<210> 20  
<211> 158  
<212> PRT  
<213> Human papillomavirus type 45

<400> 20

Met Ala Arg Phe Asp Asp Pro Lys Gln Arg Pro Tyr Lys Leu Pro Asp  
1 5 10 15

Leu Cys Thr Glu Leu Asn Thr Ser Leu Gln Asp Val Ser Ile Ala Cys  
20 25 30

Val Tyr Cys Lys Ala Thr Leu Glu Arg Thr Glu Val Tyr Gln Phe Ala  
35 40 45

Phe Lys Asp Leu Cys Ile Val Tyr Arg Asp Cys Ile Ala Tyr Ala Ala  
50 55 60

Cys His Lys Cys Ile Asp Phe Tyr Ser Arg Ile Arg Glu Leu Arg Tyr  
65 70 75 80

Tyr Ser Asn Ser Val Tyr Gly Glu Thr Leu Glu Lys Ile Thr Asn Thr  
85 90 95

Glu Leu Tyr Asn Leu Leu Ile Arg Cys Leu Arg Cys Gln Lys Pro Leu

100 105 110

Asn Pro Ala Glu Lys Arg Arg His Leu Lys Asp Lys Arg Arg Phe His  
115 120 125

Ser Ile Ala Gly Gln Tyr Arg Gly Gln Cys Asn Thr Cys Cys Asp Gln  
130 135 140

Ala Arg Gln Glu Arg Leu Arg Arg Arg Arg Glu Thr Gln Val  
145 150 155

<210> 21  
<211> 151  
<212> PRT  
<213> Human papillomavirus type 51

<400> 21

Met Phe Glu Asp Lys Arg Glu Arg Pro Arg Thr Leu His Glu Leu Cys  
1 5 10 15

Glu Ala Leu Asn Val Ser Met His Asn Ile Gln Val Val Cys Val Tyr  
20 25 30

Cys Lys Lys Glu Leu Cys Arg Ala Asp Val Tyr Asn Val Ala Phe Thr  
35 40 45

Glu Ile Lys Ile Val Tyr Arg Asp Asn Asn Pro Tyr Ala Val Cys Lys  
50 55 60

Gln Cys Leu Leu Phe Tyr Ser Lys Ile Arg Glu Tyr Arg Arg Tyr Ser  
65 70 75 80

Arg Ser Val Tyr Gly Thr Thr Leu Glu Ala Ile Thr Lys Lys Ser Leu  
85 90 95

Tyr Asp Leu Ser Ile Arg Cys His Arg Cys Gln Arg Pro Leu Gly Pro  
100 105 110

Glu Glu Lys Gln Lys Leu Val Asp Glu Lys Lys Arg Phe His Glu Ile  
115 120 125

Ala Gly Arg Trp Thr Gly Gln Cys Ala Asn Cys Trp Gln Arg Thr Arg  
130 135 140

Gln Arg Asn Glu Thr Gln Val  
145 150

<210> 22  
<211> 148  
<212> PRT  
<213> Human papillomavirus type 52

&lt;400&gt; 22

Met Phe Glu Asp Pro Ala Thr Arg Pro Arg Thr Leu His Glu Leu Cys  
 1 5 10 15

Glu Val Leu Glu Glu Ser Val His Glu Ile Arg Leu Gln Cys Val Gln  
 20 25 30

Cys Lys Lys Glu Leu Gln Arg Arg Glu Val Tyr Lys Phe Leu Phe Thr  
 35 40 45

Asp Leu Arg Ile Val Tyr Arg Asp Asn Asn Pro Tyr Gly Val Cys Ile  
 50 55 60

Met Cys Leu Arg Phe Leu Ser Lys Ile Ser Glu Tyr Arg His Tyr Gln  
 65 70 75 80

Tyr Ser Leu Tyr Gly Lys Thr Leu Glu Glu Arg Val Lys Lys Pro Leu  
 85 90 95

Ser Glu Ile Thr Ile Arg Cys Ile Ile Cys Gln Thr Pro Leu Cys Pro  
 100 105 110

Glu Glu Lys Glu Arg His Val Asn Ala Asn Lys Arg Phe His Asn Ile  
 115 120 125

Met Gly Arg Trp Thr Gly Arg Cys Ser Glu Cys Trp Arg Pro Arg Pro  
 130 135 140

Val Thr Gln Val  
 145

&lt;210&gt; 23

&lt;211&gt; 155

&lt;212&gt; PRT

&lt;213&gt; Human papillomavirus type 56

&lt;400&gt; 23

Met Glu Pro Gln Phe Asn Asn Pro Gln Glu Arg Pro Arg Ser Leu His  
 1 5 10 15

His Leu Ser Glu Val Leu Glu Ile Pro Leu Ile Asp Leu Arg Leu Ser  
 20 25 30

Cys Val Tyr Cys Lys Lys Glu Leu Thr Arg Ala Glu Val Tyr Asn Phe  
 35 40 45

Ala Cys Thr Glu Leu Lys Leu Val Tyr Arg Asp Asp Phe Pro Tyr Ala  
 50 55 60

Val Cys Arg Val Cys Leu Leu Phe Tyr Ser Lys Val Arg Lys Tyr Arg  
65 70 75 80

Tyr Tyr Asp Tyr Ser Val Tyr Gly Ala Thr Leu Glu Ser Ile Thr Lys  
85 90 95

Lys Gln Leu Cys Asp Leu Leu Ile Arg Cys Tyr Arg Cys Gln Ser Pro  
100 105 110

Leu Thr Pro Glu Glu Lys Gln Leu His Cys Asp Arg Lys Arg Arg Phe  
115 120 125

His Leu Ile Ala His Gly Trp Thr Gly Ser Cys Leu Gly Cys Trp Arg  
130 135 140

Gln Thr Ser Arg Glu Pro Arg Glu Ser Thr Val  
145 150 155

<210> 24  
<211> 149  
<212> PRT  
<213> Human papillomavirus type 58

<400> 24

Met Phe Gln Asp Ala Glu Glu Lys Pro Arg Thr Leu His Asp Leu Cys  
1 5 10 15

Gln Ala Leu Glu Thr Ser Val His Glu Ile Glu Leu Lys Cys Val Glu  
20 25 30

Cys Lys Lys Thr Leu Gln Arg Ser Glu Val Tyr Asp Phe Val Phe Ala  
35 40 45

Asp Leu Arg Ile Val Tyr Arg Asp Gly Asn Pro Phe Ala Val Cys Lys  
50 55 60

Val Cys Leu Arg Leu Leu Ser Lys Ile Ser Glu Tyr Arg His Tyr Asn  
65 70 75 80

Tyr Ser Leu Tyr Gly Asp Thr Leu Glu Gln Thr Leu Lys Lys Cys Leu  
85 90 95

Asn Glu Ile Leu Ile Arg Cys Ile Ile Cys Gln Arg Pro Leu Cys Pro  
100 105 110

Gln Glu Lys Lys Arg His Val Asp Leu Asn Lys Arg Phe His Asn Ile  
115 120 125

Ser Gly Arg Trp Thr Gly Arg Cys Ala Val Cys Trp Arg Pro Arg Arg  
130 135 140

Arg Gln Thr Gln Val  
145

<210> 25  
<211> 160  
<212> PRT  
<213> Human papillomavirus type 59  
  
<400> 25

Met Ala Arg Phe Glu Asp Pro Thr Gln Arg Pro Tyr Lys Leu Pro Asp  
1 5 10 15

Leu Ser Thr Thr Leu Asn Ile Pro Leu His Asp Ile Arg Ile Asn Cys  
20 25 30

Val Phe Cys Lys Gly Glu Leu Gln Glu Arg Glu Val Phe Glu Phe Ala  
35 40 45

Phe Asn Asp Leu Phe Ile Val Tyr Arg Asp Cys Thr Pro Tyr Ala Ala  
50 55 60

Cys Leu Lys Cys Ile Ser Phe Tyr Ala Arg Val Arg Glu Leu Arg Tyr  
65 70 75 80

Tyr Arg Asp Ser Val Tyr Gly Glu Thr Leu Glu Ala Glu Thr Lys Thr  
85 90 95

Pro Leu His Glu Leu Leu Ile Arg Cys Tyr Arg Cys Leu Lys Pro Leu  
100 105 110

Cys Pro Thr Asp Lys Leu Lys His Ile Thr Glu Lys Arg Arg Phe His  
115 120 125

Asn Ile Ala Gly Ile Tyr Thr Gly Gln Cys Arg Gly Cys Arg Thr Arg  
130 135 140

Ala Arg His Leu Arg Gln Gln Arg Gln Ala Arg Ser Glu Thr Leu Val  
145 150 155 160

<210> 26  
<211> 158  
<212> PRT  
<213> Human papillomavirus type 68  
  
<400> 26

Met Ala Leu Phe His Asn Pro Glu Glu Arg Pro Tyr Lys Leu Pro Asp  
1 5 10 15

Leu Cys Arg Thr Leu Asp Thr Thr Leu His Asp Val Thr Ile Asp Cys  
20 25 30

Val Tyr Cys Arg Arg Gln Leu Gln Arg Thr Glu Val Tyr Glu Phe Ala  
 35 40 45

Phe Ser Asp Leu Cys Val Val Tyr Arg Asp Gly Val Pro Phe Ala Ala  
 50 55 60

Cys Gln Ser Cys Ile Lys Phe Tyr Ala Lys Ile Arg Glu Leu Arg Tyr  
 65 70 75 80

Tyr Ser Glu Ser Val Tyr Ala Thr Thr Leu Glu Thr Ile Thr Asn Thr  
 85 90 95

Lys Leu Tyr Asn Leu Leu Ile Arg Cys Met Ser Cys Leu Lys Pro Leu  
 100 105 110

Cys Pro Ala Glu Lys Leu Arg His Leu Thr Thr Lys Arg Arg Leu His  
 115 120 125

Lys Ile Ala Gly Asn Phe Thr Gly Gln Cys Arg His Cys Trp Thr Ser  
 130 135 140

Lys Arg Glu Asp Arg Arg Arg Ile Arg Gln Glu Thr Gln Val  
 145 150 155

<210> 27  
 <211> 105  
 <212> PRT  
 <213> Human papillomavirus type 18

<400> 27

Met His Gly Pro Lys Ala Thr Leu Gln Asp Ile Val Leu His Leu Glu  
 1 5 10 15

Pro Gln Asn Glu Ile Pro Val Asp Leu Leu Cys His Glu Gln Leu Ser  
 20 25 30

Asp Ser Glu Glu Glu Asn Asp Glu Ile Asp Gly Val Asn His Gln His  
 35 40 45

Leu Pro Ala Arg Arg Ala Glu Pro Gln Arg His Thr Met Leu Cys Met  
 50 55 60

Cys Cys Lys Cys Glu Ala Arg Ile Lys Leu Val Val Glu Ser Ser Ala  
 65 70 75 80

Asp Asp Leu Arg Ala Phe Gln Gln Leu Phe Leu Asn Thr Leu Ser Phe  
 85 90 95

Val Cys Pro Trp Cys Ala Ser Gln Gln  
 100 105

<210> 28  
 <211> 98  
 <212> PRT  
 <213> Human papillomavirus type 31

<400> 28

Met Arg Gly Glu Thr Pro Thr Leu Gln Asp Tyr Val Leu Asp Leu Gln  
 1 5 10 15

Pro Glu Ala Thr Asp Leu His Cys Tyr Glu Gln Leu Pro Asp Ser Ser  
 20 25 30

Asp Glu Glu Asp Val Ile Asp Ser Pro Ala Gly Gln Ala Glu Pro Asp  
 35 40 45

Thr Ser Asn Tyr Asn Ile Val Thr Phe Cys Cys Gln Cys Lys Ser Thr  
 50 55 60

Leu Arg Leu Cys Val Gln Ser Thr Gln Val Asp Ile Arg Ile Leu Gln  
 65 70 75 80

Glu Leu Leu Met Gly Ser Phe Gly Ile Val Cys Pro Asn Cys Ser Thr  
 85 90 95

Arg Leu

<210> 29  
 <211> 97  
 <212> PRT  
 <213> Human papillomavirus type 33

<400> 29

Met Arg Gly His Lys Pro Thr Leu Lys Glu Tyr Val Leu Asp Leu Tyr  
 1 5 10 15

Pro Glu Pro Thr Asp Leu Tyr Cys Tyr Glu Gln Leu Ser Asp Ser Ser  
 20 25 30

Asp Glu Asp Glu Gly Leu Asp Arg Pro Asp Gly Gln Ala Gln Pro Ala  
 35 40 45

Thr Ala Asp Tyr Tyr Ile Val Thr Cys Cys His Thr Cys Asn Thr Thr  
 50 55 60

Val Arg Leu Cys Val Asn Ser Thr Ala Ser Asp Leu Arg Thr Ile Gln  
 65 70 75 80

Gln Leu Leu Met Gly Thr Val Asn Ile Val Cys Pro Thr Cys Ala Gln  
 85 90 95

Gln

<210> 30  
 <211> 99  
 <212> PRT  
 <213> Human papillomavirus type 35

<400> 30

Met His Gly Glu Ile Thr Thr Leu Gln Asp Tyr Val Leu Asp Leu Glu  
 1 5 10 15

Pro Glu Ala Thr Asp Leu Tyr Cys Tyr Glu Gln Leu Cys Asp Ser Ser  
 20 25 30

Glu Glu Glu Glu Asp Thr Ile Asp Gly Pro Ala Gly Gln Ala Lys Pro  
 35 40 45

Asp Thr Ser Asn Tyr Asn Ile Val Thr Ser Cys Cys Lys Cys Glu Ala  
 50 55 60

Thr Leu Arg Leu Cys Val Gln Ser Thr His Ile Asp Ile Arg Lys Leu  
 65 70 75 80

Glu Asp Leu Leu Met Gly Thr Phe Gly Ile Val Cys Pro Gly Cys Ser  
 85 90 95

Gln Arg Ala

<210> 31  
 <211> 109  
 <212> PRT  
 <213> Human papillomavirus type 39

<400> 31

Met Arg Gly Pro Lys Pro Thr Leu Gln Glu Ile Val Leu Asp Leu Cys  
 1 5 10 15

Pro Tyr Asn Glu Ile Gln Pro Val Asp Leu Val Cys His Glu Gln Leu  
 20 25 30

Gly Glu Ser Glu Asp Glu Ile Asp Glu Pro Asp His Ala Val Asn His  
 35 40 45

Gln His Gln Leu Leu Ala Arg Arg Asp Glu Pro Gln Arg His Thr Ile  
 50 55 60

Gln Cys Ser Cys Cys Lys Cys Asn Asn Thr Leu Gln Leu Val Val Glu  
 65 70 75 80

Leu Gly Phe Val Cys Pro Trp Cys Ala Thr Ala Asn Gln  
100 105

<400> 32

Pro Gln Asn Glu Leu Asp Pro Val Asp Leu Leu Cys Tyr Glu Gln Leu  
20 25 30

Ser Glu Ser Glu Glu Glu Asn Asp Glu Ala Asp Gly Val Ser His Ala  
35 40 45

Gln Leu Pro Ala Arg Arg Ala Glu Pro Gln Arg His Lys Ile Leu Cys  
50 55 60

Val Cys Cys Lys Cys Asp Gly Arg Ile Glu Leu Thr Val Glu Ser Ser  
65 70 75 80

Ala Glu Asp Leu Arg Thr Leu Gln Gln Leu Phe Leu Ser Thr Leu Ser  
85 90 95

Phe Val Cys Pro Trp Cys Ala Thr Asn Gln  
100 105

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<210> 33
<211> 101
<212> PRT
<213> Human papillomavirus type 51
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<400> 33

Met Arg Gly Asn Val Pro Gln Leu Lys Asp Val Val Leu His Leu Thr  
1 5 10 15

Pro Gln Thr Glu Ile Asp Leu Gln Cys Tyr Glu Gln Phe Asp Ser Ser  
20 25 30

Glu Glu Glu Asp Glu Val Asp Asn Met Arg Asp Gln Leu Pro Glu Arg  
35 40 45

Arg Ala Gly Gln Ala Thr Cys Tyr Arg Ile Glu Ala Pro Cys Cys Arg  
50 55 60

Cys Ser Ser Val Val Gln Leu Ala Val Glu Ser Ser Gly Asp Thr Leu  
65 70 75 80

Arg Val Val Gln Gln Met Leu Met Gly Glu Leu Ser Leu Val Cys Pro  
85 90 95

Cys Cys Ala Asn Asn  
100

<210> 34  
<211> 99  
<212> PRT  
<213> Human papillomavirus type 52

<400> 34

Met Arg Gly Asp Lys Ala Thr Ile Lys Asp Tyr Ile Leu Asp Leu Gln  
1 5 10 15

Pro Glu Thr Thr Asp Leu His Cys Tyr Glu Gln Leu Gly Asp Ser Ser  
20 25 30

Asp Glu Glu Asp Thr Asp Gly Val Asp Arg Pro Asp Gly Gln Ala Glu  
35 40 45

Gln Ala Thr Ser Asn Tyr Tyr Ile Val Thr Tyr Cys His Ser Cys Asp  
50 55 60

Ser Thr Leu Arg Leu Cys Ile His Ser Thr Ala Thr Asp Leu Arg Thr  
65 70 75 80

Leu Gln Gln Met Leu Leu Gly Thr Leu Gln Val Val Cys Pro Gly Cys  
85 90 95

Ala Arg Leu

<210> 35  
<211> 105  
<212> PRT  
<213> Human papillomavirus type 56

<400> 35

Met His Gly Lys Val Pro Thr Leu Gln Asp Val Val Leu Glu Leu Thr  
1 5 10 15

Pro Gln Thr Glu Ile Asp Leu Gln Cys Asn Glu Gln Leu Asp Ser Ser  
20 25 30

Glu Asp Glu Asp Glu Asp Glu Val Asp His Leu Gln Glu Arg Pro Gln  
35 40 45

Gln Ala Arg Gln Ala Lys Gln His Thr Cys Tyr Leu Ile His Val Pro  
 50 55 60

Cys Cys Glu Cys Lys Phe Val Val Gln Leu Asp Ile Gln Ser Thr Lys  
 65 70 75 80

Glu Asp Leu Arg Val Val Gln Gln Leu Leu Met Gly Ala Leu Thr Val  
 85 90 95

Thr Cys Pro Leu Cys Ala Ser Ser Asn  
 100 105

<210> 36  
 <211> 98  
 <212> PRT  
 <213> Human papillomavirus type 58

<400> 36

Met Arg Gly Asn Asn Pro Thr Leu Arg Glu Tyr Ile Leu Asp Leu His  
 1 5 10 15

Pro Glu Pro Thr Asp Leu Phe Cys Tyr Glu Gln Leu Cys Asp Ser Ser  
 20 25 30

Asp Glu Asp Glu Ile Gly Leu Asp Gly Pro Asp Gly Gln Ala Gln Pro  
 35 40 45

Ala Thr Ala Asn Tyr Tyr Ile Val Thr Cys Cys Tyr Thr Cys Gly Thr  
 50 55 60

Thr Val Arg Leu Cys Ile Asn Ser Thr Thr Thr Asp Val Arg Thr Leu  
 65 70 75 80

Gln Gln Leu Leu Met Gly Thr Cys Thr Ile Val Cys Pro Ser Cys Ala  
 85 90 95

Gln Gln

<210> 37  
 <211> 107  
 <212> PRT  
 <213> Human papillomavirus type 59

<400> 37

Met His Gly Pro Lys Ala Thr Leu Cys Asp Ile Val Leu Asp Leu Glu  
 1 5 10 15

Pro Gln Asn Tyr Glu Glu Val Asp Leu Val Cys Tyr Glu Gln Leu Pro  
 20 25 30

Asp Ser Asp Ser Glu Asn Glu Lys Asp Glu Pro Asp Gly Val Asn His  
 35 40 45

Pro Leu Leu Leu Ala Arg Arg Ala Glu Pro Gln Arg His Asn Ile Val  
 50 55 60

Cys Val Cys Cys Lys Cys Asn Asn Gln Leu Gln Leu Val Val Glu Thr  
 65 70 75 80

Ser Gln Asp Gly Leu Arg Ala Leu Gln Gln Leu Phe Met Asp Thr Leu  
 85 90 95

Ser Phe Val Cys Pro Leu Cys Ala Ala Asn Gln  
 100 105

<210> 38  
 <211> 110  
 <212> PRT  
 <213> Human papillomavirus type 68

<400> 38

Met His Gly Pro Lys Pro Thr Val Gln Glu Ile Val Leu Glu Leu Cys  
 1 5 10 15

Pro Tyr Asn Glu Ile Gln Pro Val Asp Leu Val Cys His Glu Gln Leu  
 20 25 30

Gly Asp Ser Asp Asp Glu Ile Asp Glu Pro Asp His Ala Val Asn His  
 35 40 45

His Gln His Leu Leu Leu Ala Arg Arg Asp Glu Gln Gln Arg His Arg  
 50 55 60

Ile Gln Cys Leu Cys Cys Lys Cys Asn Lys Ala Leu Gln Leu Val Val  
 65 70 75 80

Glu Ala Ser Arg Asp Asn Leu Arg Thr Leu Gln Gln Leu Phe Met Asp  
 85 90 95

Ser Leu Asn Phe Val Cys Pro Trp Cys Ala Thr Glu Thr Gln  
 100 105 110

<210> 39  
 <211> 152  
 <212> PRT  
 <213> Human papillomavirus

<220>  
 <221> MISC\_FEATURE  
 <222> (1)..(152)  
 <223> where Xaa is any amino acid

<400> 39

Xaa Xaa Xaa Phe Glx Asp Pro Xaa Glu Arg Pro Xaa Lys Leu Xaa Asp  
1 5 10 15

Leu Cys Xaa Xaa Leu Xaa Xaa Xaa Xaa His Asx Ile Xaa Xaa Xaa Cys  
20 25 30

Val Tyr Cys Lys Xaa Glx Leu Glx Arg Xaa Glu Val Tyr Xaa Phe Ala  
35 40 45

Phe Xaa Asp Leu Xaa Ile Val Tyr Arg Asp Xaa Xaa Pro Xaa Ala Xaa  
50 55 60

Cys Xaa Xaa Cys Leu Xaa Phe Tyr Ser Lys Ile Xaa Glu Xaa Arg Xaa  
65 70 75 80

Tyr Xaa Xaa Ser Val Tyr Gly Xaa Thr Leu Glu Xaa Xaa Thr Xaa Lys  
85 90 95

Xaa Leu Xaa Asx Leu Leu Ile Arg Cys Xaa Xaa Cys Gln Xaa Pro Leu  
100 105 110

Cys Pro Xaa Glu Lys Xaa Arg His Xaa Asx Xaa Lys Xaa Arg Phe His  
115 120 125

Asn Ile Xaa Gly Xaa Trp Thr Gly Xaa Cys Xaa Xaa Cys Trp Xaa Xaa  
130 135 140

Xaa Arg Xaa Xaa Xaa Xaa Xaa Xaa  
145 150

<210> 40

**<211> 104**

<212> PRT

<212> PRI  
<213> Human papillomavirus

**<220>**

<221> MISC\_FEATURE

<222> (1) . (104)

<222> (1)..(104)  
<223> where Xaa is any amino acid

<400> 40

Met Xaa Gly Xaa Xaa Pro Thr Leu Xaa Xaa Xaa Val Leu Asp Leu Xaa  
1 5 10 15

Pro Glx Xaa Xaa Xaa Asp Leu Xaa Cys Tyr Glu Gln Leu Xaa Asp Ser  
20 25 30

Xaa Xaa Glu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa

35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Tyr Xaa Ile Xaa Xaa Xaa Cys  
50 55 60

Cys Xaa Cys Xaa Xaa Xaa Xaa Xaa Leu Xaa Val Glx Ser Xaa Xaa Xaa  
65 70 75 80

Asp Leu Arg Xaa Leu Gln Gln Leu Leu Met Gly Thr Leu Xaa Xaa Val  
85 90 95

Cys Pro Xaa Cys Ala Xaa Xaa Xaa  
100

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<210> 41
<211> 9
<212> PRT
<213> Human papillomavirus type 16
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<400> 41

Arg Ala His Tyr Asn Ile Val Thr Phe  
1 5

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<210> 42
<211> 477
<212> DNA
<213> Human papillomavirus type 18
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[illegible]

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<210> 43
<211> 474
<212> DNA
<213> Human papillomavirus type 31
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[illegible]

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attaggtgta taactgtgtca aagaccgttg tgtccagaag aaaaacaaag acatttgat 360  
aaaaagaaac gattccacaa cataggagga aggtggacag gacgttgcac agcatgttgg 420  
agaagacctc gtactgaaac ccaagtgtaa acatgcgtgg agaaacacct acgt 474

<210> 44  
<211> 450  
<212> DNA  
<213> Human papillomavirus type 33

<400> 44  
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gaggtatatg attttgcatt tgcagattta acagttgtat atagagaggg aaatccattt 180  
ggaatatgta aactgtgttt gcggttctta tctaaaatta gtgaatatag acattataat 240  
tattctgtat atggaaatac attagaacaa acagttaaaa aacctttaaa tgaaatatta 300  
attaggtgta ttatatgtca aagacctttg tgtcctcaag aaaaaaacg acatgtggat 360  
ttaaacaac gatttcataa ttttcgggt cgttgggcag ggcgctgtgc ggcgtgttgg 420  
agggtccgcgac gtagagaaac tgcactgtga 450

<210> 45  
<211> 450  
<212> DNA  
<213> Human papillomavirus type 35

<400> 45  
atgtttcagg acccagctga acgaccttac aaactgcatg atttgtgcaa cgaggtagaa 60  
gaaagcatcc atgaaatttg tttgaattgt gtatactgca aacaagaatt acagcggagt 120  
gaggtatatg actttgcatg ctatgatttg tgtatagtat atagagaagg ccagccatat 180  
ggagtatgca tgaatgttt aaaattttat tcaaaaataa gtgaatatag atggtataga 240  
tatagtgtgt atggagaaac gttagaaaaa caatgcaaca aacagttatg tcatttatta 300  
attaggtgta ttacatgtca aaaaccgctg tgtccagttg aaaagcaaag acatttagaa 360  
gaaaaaaaac gattccataa catcgggtgga cggtggacag gtcggtgtat gtccgttgg 420  
aaaccaacac gtagagaaac cgaggtgtaa 450

<210> 46  
<211> 477  
<212> DNA  
<213> Human papillomavirus type 39

<400> 46  
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caaaccgagg tatatgaatt tgcatttagt gatttatatg tagtatatag ggacggggaa 180  
 ccactagctg catgccaatc atgtataaaa ttttatgcta aaatacggga gctacgatat 240  
 tactcggaact cgggtgatgc aactacatta gaaaatataa ctaatacaaa gttatataat 300  
 ttattaataa ggtgcatgtg ttgtctgaaa ccgctgtgtc cagcagaaaa attaagacac 360  
 ctaaatagca aacgaagatt tcataaaata gcaggaagct atacaggaca gtgtcgacgg 420  
 tgctggacca caaacggga ggaccgcaga ctaacacgaa gagaaacca agtataa 477

<210> 47  
 <211> 477  
 <212> DNA  
 <213> Human papillomavirus type 45

<400> 47  
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 ttgaatacat cactacaaga cgtatctatt gcctgtgtat attgcaaagc aacattggaa 120  
 cgcacagagg tatatcaatt tgcttttaaa gatttatgta tagtgtatag agactgtata 180  
 gcatatgctg catgccataa atgtatagac ttttattcca gaattagaga attaagatat 240  
 tattcaaact ctgtatatgg agagacactg gaaaaataa ctaatacaga gttgtataat 300  
 ttgttaataa ggtgcctgcg gtgccagaaa ccattgaacc cagcagaaaa acgtagacac 360  
 cttaaggaca aacgaagatt tcacagcata gctggacagt accgagggca gtgtaataca 420  
 tgttgtgacc aggcacggca agaaagactt cgcagacgta gggaaacaca agtatag 477

<210> 48  
 <211> 456  
 <212> DNA  
 <213> Human papillomavirus type 51

<400> 48  
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 gatgtatata atgtagcatt tactgaaatt aagattgtat atagggataa taatccatat 180  
 gcagtatgca aacaatgttt actgttttat tcaaaaatta gagagtatag acgttatagc 240  
 aggtctgtgt atggtactac attagaggca attactaaaa aaagcttata tgatttatcg 300  
 ataaggtgtc atagatgtca aagaccactt gggcctgaag aaaagcaaaa attggtggac 360  
 gaaaaaaaaa gggtccatga aatagcggga cgttgacgg ggcaatgcgc taattgctgg 420  
 caacgtacac gacaacgtaa cgaaacccaa gtgtaa 456

<210> 49  
 <211> 447  
 <212> DNA  
 <213> Human papillomavirus type 52

<400> 49  
 atgtttgagg atccagcaac acgaccccg accctgcacg aattgtgtga ggtgctggaa 60

gaatcgggtgc atgaaataag gctgcagtgt gtgcagtgc aaaaagagct acaacgaaga 120  
 gaggtataca agtttctatt tacagattta cgaatagtat atagagacaa taatccatat 180  
 ggcgtgtgta ttatgtgcct acgcttttta tctaagataa gtgaatatag gcattatcaa 240  
 tattcactgt atgggaaaac attagaagag agggtaaaaa aaccattaag tgaaataact 300  
 attagatgta taatttgtca aacgccatta tgtcctgaag aaaaagaaag acatgttaat 360  
 gcaaacaagc gatttcataa tattatgggt cggtggacag ggcgctgttc agagtgttgg 420  
 agaccccgac ctgtgaccca agtgtaa 447

<210> 50  
 <211> 465  
 <212> DNA  
 <213> Human papillomavirus type 56

<400> 50  
 atggagccac aattcaacaa tccacaggaa cgtccacgaa gcctgcacca cttgagtga 60  
 gtattagaaa tacctttaat tgatcttaga ttatcatgtg tatattgcaa aaaagaacta 120  
 acacgtgctg aggtatataa ttttgcatgc actgaattaa aattagtgtg tagggatgat 180  
 tttccttatg cagtgtgcag agtatgttta ttgttttata gtaaagttag aaaatatagg 240  
 tattatgact attcagtgtg tggagctaca ctagaagta taactaaaaa acagttatgt 300  
 gatttattaa taagggtgcta cagatgtcaa agtccgttaa ctccggagga aaagcaattg 360  
 cattgtgaca gaaaaagacg atttcatcta atagcacatg gttggaccgg gtcatgtttg 420  
 ggggtgctgga gacaaacatc tagagaacct agagaatcta cagta 465

<210> 51  
 <211> 450  
 <212> DNA  
 <213> Human papillomavirus type 58

<400> 51  
 atgttccagg acgcagagga gaaaccacgg acattgcatg atttgtgtca ggcgttggag 60  
 acatctgtgc atgaaatcga attgaaatgc gttgaatgca aaaagacttt gcagcgatct 120  
 gaggtatatg actttgtatt tgcagattta agaatagtgt atagagatgg aaatccattt 180  
 gcagtatgta aagtgtgctt acgattgcta tctaaaataa gtgagtatag acattataat 240  
 tattcgctat atggagacac attagaacaa acactaaaaa agtggtttaaa tgaaatatta 300  
 attagatgta ttatttgtca aagaccattg tgtccacaag aaaaaaaaag gcatgtggat 360  
 ttaaacaaaa ggtttcataa tatttcgggt cggtggacag ggcgctgtgc agtgtgttgg 420  
 agaccccgac gtagacaaac acaagtgtaa 450

<210> 52  
 <211> 483  
 <212> DNA  
 <213> Human papillomavirus type 59

<400> 52  
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 ttgaatattc ctctgcatga tattcgcatc aattgtgtgt tttgcaaagg ggaactgcaa 120  
 gaaagagagg tatttgaatt tgcttttaat gacttattta tagtgatatag agactgtaca 180  
 ccgtatgcag cgtgtctgaa atgcatttca ttttatgcaa gagtaagaga attaagatat 240  
 tatagagatt ccgtgtatgg agaaacatta gaggctgaaa ccaagacacc gttacatgag 300  
 ctgctgatac gctgttatag atgcctaaaa cctctatgtc caacagataa attaaagcat 360  
 ataactgaaa aaagaagatt ccataatata gctggaatat atacaggaca gtgtcgtggg 420  
 tgctcgaccc gagcaagaca cctaagacag caacgacaag cgcgtagtga aacactgggtg 480  
 taa 483

<210> 53  
 <211> 477  
 <212> DNA  
 <213> Human papillomavirus type 68

<400> 53  
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 cggacagagg tatatgaatt tgcctttagt gacctatgtg tagtgatatag agacggggta 180  
 ccatttgctg catgccaatc atgtattaaa ttttatgcta aaatacggga actacgatat 240  
 tactcggaat cgggtgtatgc aactacatta gaaaccataa ctaatacaaa gttatataat 300  
 ttattgataa ggtgcatgag ttgcctgaaa ccattgtgtc cagcagaaaa actaaggcac 360  
 ctaacaacaa aacgaagatt acataaaata gcaggaaact ttacaggaca gtgtcggcac 420  
 tgctggacca gtaagcgaga ggaccgcaga cgcatacgtc aagaaacaca agtttaa 477

<210> 54  
 <211> 318  
 <212> DNA  
 <213> Human papillomavirus type 18

<400> 54  
 atgcatggac ctaaggcaac attgcaagac attgtattgc atttagagcc ccaaaatgaa 60  
 attccggttg accttctatg tcacgagcaa ttaagcgact cagaggaaga aaacgatgaa 120  
 atagatggag ttaatcatca acatttacca gcccgacgag ccgaaccaca acgtcacaca 180  
 atgttggtgta tgtgttgtaa gtgtgaagcc agaattaagc tagtagtaga aagctcagca 240  
 gacgaccttc gagcattcca gcagctgttt ctgaacaccc tgctctttgt gtgtccgtgg 300  
 tgtgcatccc agcagtaa 318

<210> 55  
 <211> 297  
 <212> DNA

<213> Human papillomavirus type 31

<400> 55  
atgCGTggag aaacacctac gttgcaagac tatgtgtag atttgcaacc tgaggcaact 60  
gacctccact gttatgagca attacccgac agctcagatg aggaggatgt catagacagt 120  
ccagctggac aagcagaacc ggacacatcc aattacaata tcgttacctt ttgttgtag 180  
tgtaagtcta cacttcgttt gtgtgtacag agcacacaag tagatattcg catattgcaa 240  
gagctgttaa tgggctcatt tggaatcgtg tgccccaact gttctactag actgtaa 297

<210> 56

<211> 294

<212> DNA

<213> Human papillomavirus type 33

<400> 56  
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gacctatact gctatgagca attaagtac agctcagatg aggatgaagg cttggaccgg 120  
ccagatggac aagcacaacc agccacagct gattactaca ttgtaacctg ttgtcacact 180  
tgtaacacca cagttcgttt atgtgtcaac agtacagcaa gtgacctacg aaccatacag 240  
caactactta tgggcacagt gaatattgtg tgcctacct gtgcacaaca ataa 294

<210> 57

<211> 300

<212> DNA

<213> Human papillomavirus type 35

<400> 57  
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gacctatact gttatgagca attgtgtgac agctcagagg aggaggaaga tactattgac 120  
gggccagctg gacaagcaaa accagacacc tccaattata atattgtaac gtcctgttgt 180  
aaatgtgagg cgacactacg tctgtgtgta cagagcacac acattgacat acgtaaattg 240  
gaagatttat taatgggcac atttggaata gtgtgccccg gctgttcaca gagagcataa 300

<210> 58

<211> 330

<212> DNA

<213> Human papillomavirus type 39

<400> 58  
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atacagccgg ttgaccttgt atgtcacgag caattaggag agtcagagga tgaatatagat 120  
gaacccgacc atgcagttaa tcaccaacat caactactag ccagacggga tgaaccacag 180  
cgtcacacaa tacagtgttc gtgttgtaag tgtaacaaca cactgcagct ggtagtagaa 240  
gcctcacggg atactctgcg acaactacag cagctgttta tggactcact aggatttgtg 300  
tgtccgtggt gtgcaactgc aaaccagtaa 330

<210> 59  
 <211> 321  
 <212> DNA  
 <213> Human papillomavirus type 45

<400> 59  
 atgcatggac cccgggaaac actgcaagaa attgtattgc atttggaaacc tcagaatgaa 60  
 ttagatcctg ttgacctgtt gtgttacgag caattaagcg agtcagagga ggaaaacgat 120  
 gaagcagatg gagttagtca tgcacaacta ccagcccgac gagccgaacc acagcgtcac 180  
 aaaattttgt gtgtatgttg taagtgtgac ggcagaattg agcttacagt agagagctcg 240  
 gcagaggacc ttagaacact acagcagctg tttttgagca ccttgctcctt tgtgtgtccg 300  
 tgggtgtgcaa ctaaccaata a 321

<210> 60  
 <211> 306  
 <212> DNA  
 <213> Human papillomavirus type 51

<400> 60  
 atgcgtggta atgtaccaca attaaaagat gtagtattgc atttaacacc acagactgaa 60  
 attgacttgc aatgctacga gcaatttgac agctcagagg aggaggatga agtagataat 120  
 atgcgtgacc agctaccaga aagacgggct ggacaggcta cgtgttacag aattgaagct 180  
 ccgtgttgca ggtgttcaag ttagtagaaa ctggcagtgg aaagcagtgg agacaccctt 240  
 cgcgttgtag agcagatgtt aatgggcgaa ctaagcctgg tttgccctg ttgtgcgaac 300  
 aactag 306

<210> 61  
 <211> 300  
 <212> DNA  
 <213> Human papillomavirus type 52

<400> 61  
 atgcgtggag acaaagcaac tataaaagat tatatattag atctgcaacc tgaaacaact 60  
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 gaccggccag atggacaagc agaacaagcc acaagcaatt actacattgt gacatattgt 180  
 cacagttgtg atagcacact acggctatgc attcatagca ctgcgacgga ccttcgtact 240  
 ctacagcaaa tgctgttggg cacattacaa gttgtgtgcc ccggctgtgc acggctataa 300

<210> 62  
 <211> 318  
 <212> DNA  
 <213> Human papillomavirus type 56

<400> 62  
 atgcatggta aagtaccaac gctgcaagac gttgtattag aactaacacc tcaaacagaa 60  
 attgacctac agtgcaatga gcaattggac agctcagagg atgaggatga ggatgaagta 120

gaccatttgc aggagcggcc acagcaagct agacaagcta aacaacatac gtgttaccta 180  
 atacacgtac cttgttgtga gtgtaagttt gtggtgcagt tggacattca gagtaccaa 240  
 gaggacctgc gtgttgtaca acagctgctt atgggtgcgt taacagtaac gtgcccactc 300  
 tgcgcatcaa gtaactaa 318

<210> 63  
 <211> 297  
 <212> DNA  
 <213> Human papillomavirus type 58

<400> 63  
 atgagaggaa acaaccaaac gctaagagaa tatatttttag atttacatcc tgaaccaact 60  
 gacctattct gctatgagca attatgtgac agctcagacg aggatgaaat aggcttggac 120  
 gggccagatg gacaagcaca accggccaca gctaattact acattgtaac ttgttgttac 180  
 acttgtggca ccacggttcg tttgtgtatc aacagtacaa caaccgacgt acgaacccta 240  
 cagcagctgc ttatgggcac atgtaccatt gtgtgccta gctgtgcaca gcaataa 297

<210> 64  
 <211> 324  
 <212> DNA  
 <213> Human papillomavirus type 59

<400> 64  
 atgcatggac caaagcaac actttgtgac attgttttag atttgaacc acaaaattat 60  
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 gatgaaccag atggagttaa tcattcctttg ctactagcta gacgagctga accacagcgt 180  
 cacaacattg tgtgtgtgtg ttgtaagtgt aataatcaac ttcagctagt agtagaaacc 240  
 tcgcaagacg gattgagagc cttacagcag ctgtttatgg acacactatc ctttgtgtgt 300  
 cctttgtgtg cagcaaacca gtaa 324

<210> 65  
 <211> 333  
 <212> DNA  
 <213> Human papillomavirus type 68

<400> 65  
 atgcatggac caaagccac cgtgcaggaa attgtgttag agctatgtcc atacaatgaa 60  
 atacagccgg ttgaccttgt atgtcacgag caattaggag attcagacga tgaaatagat 120  
 gaacccgacc atgcagttaa tcaccaccaa catctactac tagccagacg ggacgaacaa 180  
 cagcgtcaca gaattcagtg tctgtgttgt aagtgtaca aggcactgca actagtagta 240  
 gaagcgtcgc gggacaacct gcggacacta caacagctgt ttatggactc actaaatatt 300  
 gtgtgtccgt ggtgtgcaac tgaaaccag taa 333